EC-1017/1018
Chassis

(Ver 1.0)

Copyright Notice

©Copyright 2002 by ICP Electronics Inc. All Rights Reserved.
Revision: 1.0. Sep, 27 2002.
The information in this document is subject to change without prior notice in order to improve reliability, design and function and does not represent a commitment on the part of the manufacturer.
In no event will the manufacturer be liable for direct, indirect, special, incidental, or consequential damages arising out of the use or inability to use the product or documentation, even if advised of the possibility of such damages.
This document contains proprietary information protected by copyright. All rights are reserved. No part of this manual may be reproduced by any mechanical, electronic, or other means in any form without prior written permission of the manufacturer.
Trademarks
EC-1017/EC-1018 is a registered trademark of ICP Electronics Inc. IBM PC is a registered trademark of International Business Machines Corporation. Intel is a registered trademark of Intel Corporation. Other product names mentioned herein are used for identification purposes only and may be trademarks and/or registered trademarks of their respective companies. If you have any questions or need other information, please visit to our web site.
http://www.iei.com.tw

Revision History:

Revision	Revision Note	Date
1.00	Initial release of the EC-1017/EC-1018 user's manual	Sep.2002

Note:
The author assumes no responsibility for any errors or omissions that may appear this manual nor does the author make a commitment to update the information contained herein.

Table of Contents

1. Introduction
    1.1 Checklist
    1.2 Features & Specifications
    1.3 Dimensions
2. System Setup
    2.1 Remove The Cover
    2.2 Disk Drives Installation
    2.3 A106 Alarm board
    2.4 Fan Installation
    2.5 Power Supply Installation
    2.6 The Backplane Installation
    2.7 The Hdd Cage Installation
    2.8 Hdd Installation

Appendix A. Alarm board user's manual
Appendix B. LCD board user's manual
Appendix C. Watchdog
Appendix D. Power Supply Specifications

1 Introduction

EC-1017/EC-1018 is a fully modular designed industrial computer chassis for standard 19” rack mount applications. It is a steel rugged chassis specially designed to work under harsh environment for high reliability application.

EC-1017/EC-1018 will withstand shock, vibration, dust and wide range of temperature in industrial environments. A lockable door protects drives and switches from unauthorized misuse and particle.

1.1 Checklist

Item	Description	Qty.
1	EC-1017/1018 User manual	1
2	Power cable	1
3	Rack mounting kit (L & Z type)	2
4	D-Sub 9 pins cable	1
5	A106 Alarm board utility diskette	1
6	Screws set • Round with washer Screw 6#32*7-------- 4 pieces • Round with washer Screw 6#32*7------- 20 pieces • Flat Screw 6#32*4---------- 12 pieces • Flat Screw 6#32*6---------- 4 pieces • Flat Screw 6#32*6---------- 4 pieces • Sink Screw M3*6----------4 pieces • Sink Screw M3*6----------4 pieces • Sink Screw M3*6----------4 pieces	1

1.2 Features and Specifications

- **Model**
  EC-1017BID (PICMG P4 CPU Board with IDE Disk Drives)
  EC-1017BSD (PICMG P4 CPU Board with SCSI Disk Drives)
  EC-1018BID (ATX P4 Mother Board with IDE Disk Drives)
  EC-1018BSD (ATX P4 Mother Board with SCSI Disk Drives)

- **Disk Drives** : One slim CD-ROM/FDD drive bay (option)
  Removable IDE Disk interface (BID Type only)
  Removable SCSI Disk interface (BSD Type only)

- **Cooling Fan** : Five Ball Bearing Fans (EC-1017 Series)
  Four Ball Bearing Fans (EC-1018 Series)

- **Power Supply** : ACE-830APU1 300W ATX power supply

- **Backplane** : 2 slots (EC-1017 Series)

- **PC main board** : P4 ATX form factor (EC-1018 Series)

- **System alarm board** : Monitoring the chassis temperature and Fan

- **Indicators** : Four LEDs display for Power , temp. , LAN and fan activities.

- **Color** : Black (Pantone Black C)

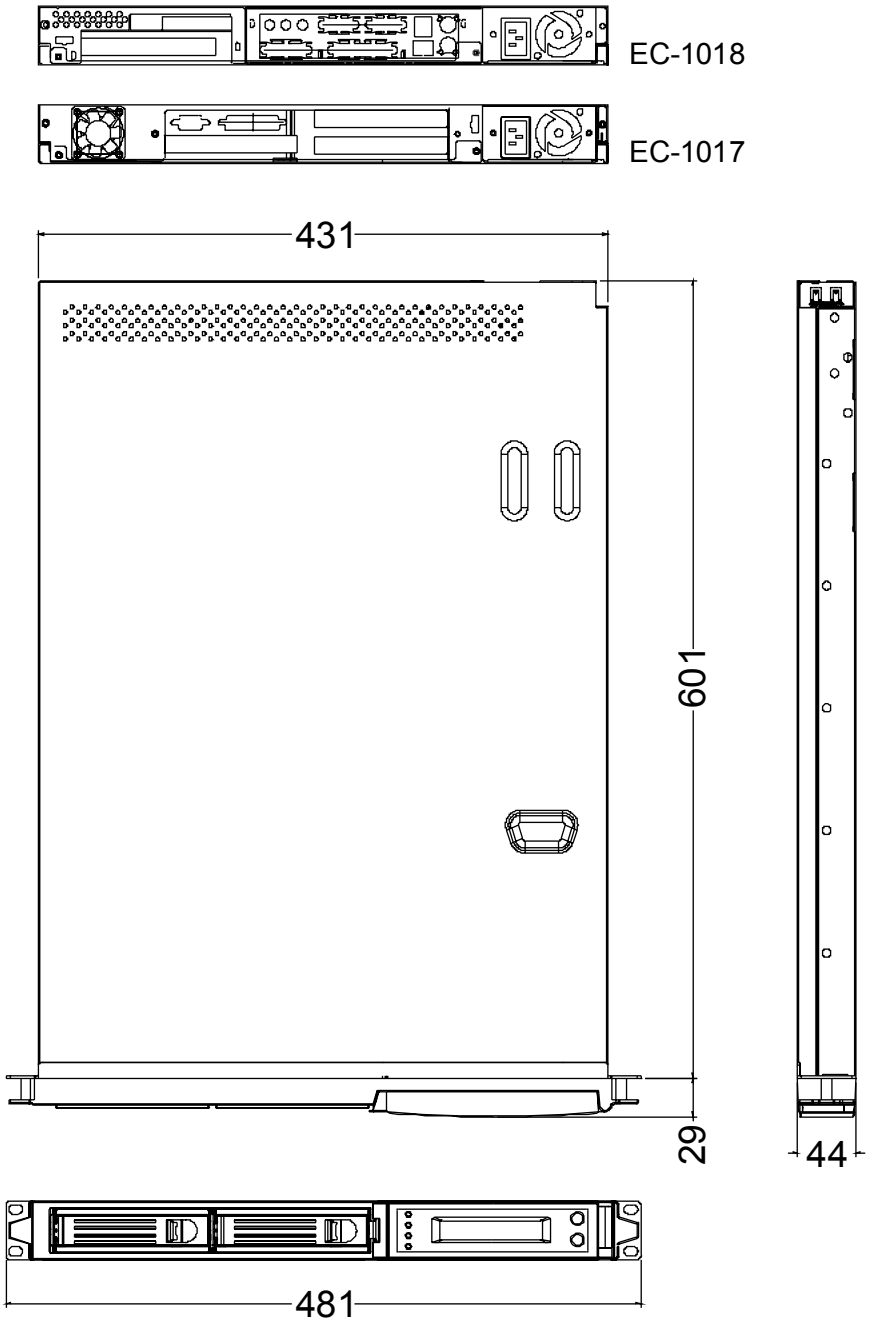
- **Sliding rail kit** : Slide-24 (Option)

Working Environment

- Operating Temperature : 0~50°C environment
- Relative Humidity : 5~95% Relative
- Vibration : 5-17Hz, 0.1" double amplitude displacement
  17-640Hz, 1.5G acceleration peak to peak
- Shock : 10G-acceleration peak to peak
- Safety approval : meet CE, FCC

1.3 Dimensions

Cabinet : 431(W) x 44 (H) x 601 (D). Unit: mm



2 Installation

The EC-1017/EC-1018 Chassis is very easy to set up for operation. All you have to do is to open the upper cover, install backplane, your CPU card, display control card, hard disk drive and other add-on cards required by your application.

2.1 Remove the cover

The top cover is fixed by 2 screws at rear side of the chassis, remove them and slide the cover to the rear of the chassis. Figure below shows how to remove the chassis cover.

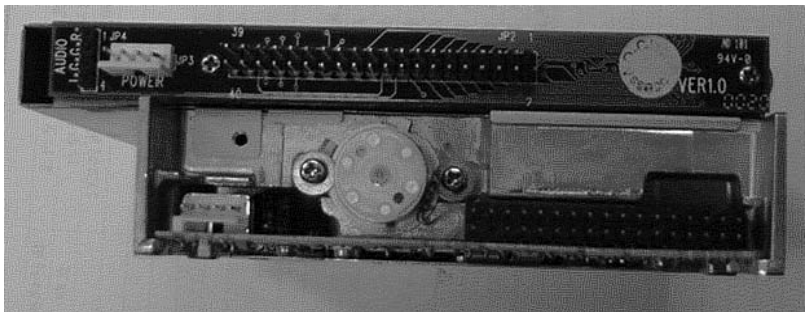
Picture of cover open

2.2 Disk Drives Installation

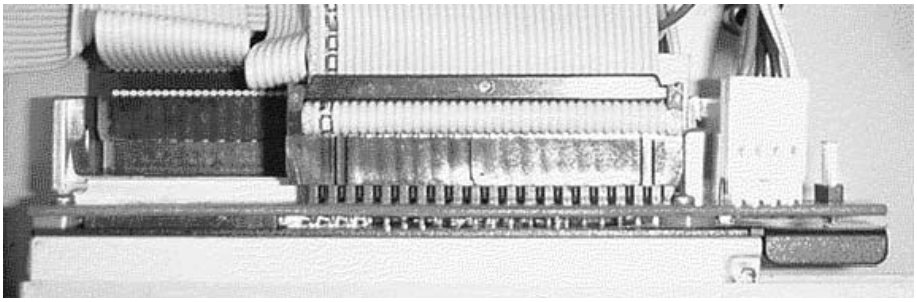
1. Open the lockable door at front side of the chassis, the Driver bay has fixed by 2 screws. Loosen screws and slide out the bay.

Picture of front view of drives cage

2. Install drives into the bay and fix it with the screws.

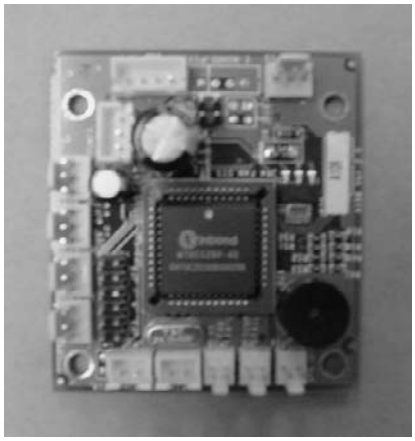


3. fixed screws and connect cable & power cable to the drive

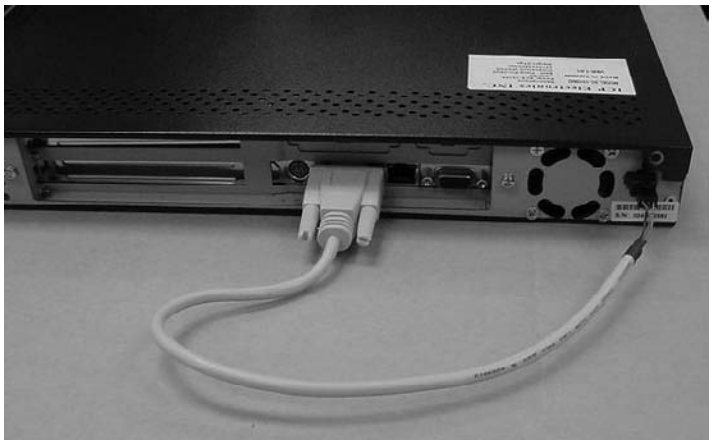


2.3 A106 Alarm Board

Connecting the CPU card RS232 port to A106 Alarm board external RS232 port for parameter setting from A106 Utility.



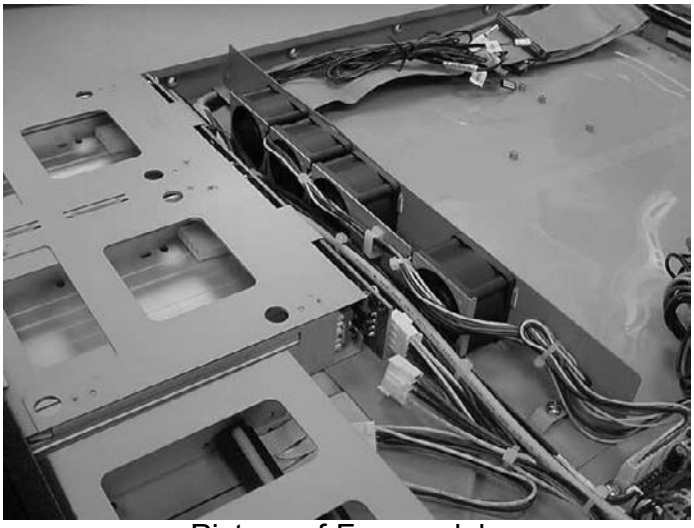
Picture of A106 Alarm board



Picture of RS 232 cable connecting with CPU card

2.4 Fan Installation

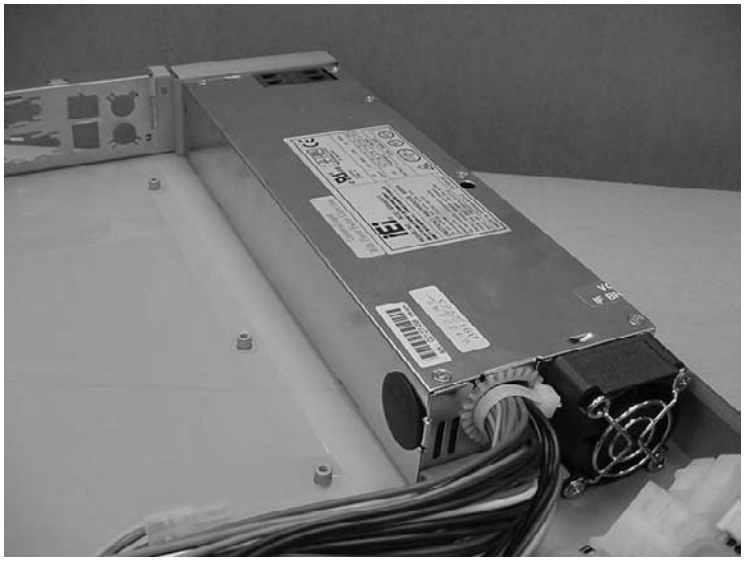
The EC-1017/EC-1018 is easy to install the fan in the chassis. It is not need any screw. Plug the fan in to the fan holder and connect the fan cable with the A106 controller board.



Picture of Fan module

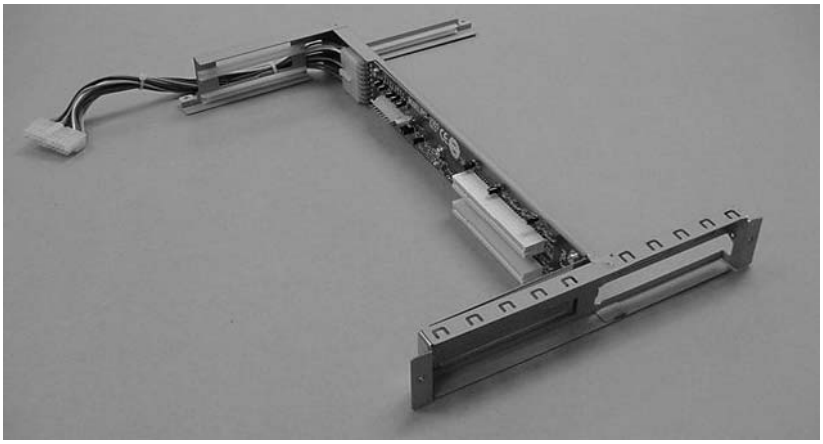
2.5 Power Supply Installation

For installation the power supply: ACE-830APU1.



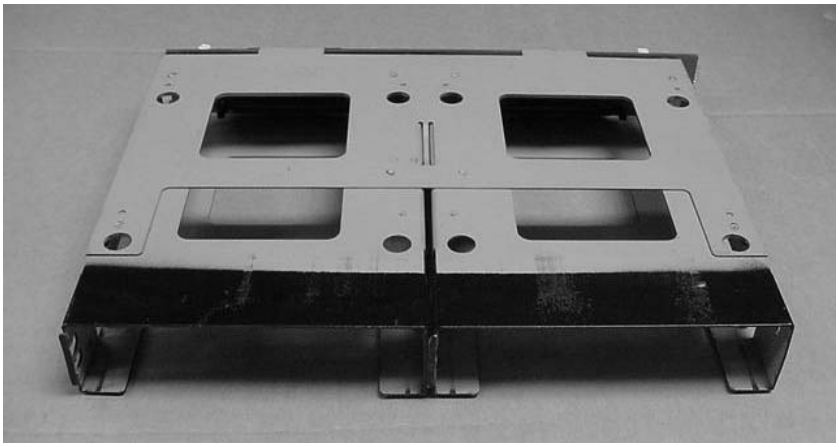
2.6 The Backplane Installation (EC-1017 only)

Put the backplanes inside the bracket and screw it. Then install CPU card , Add-on card and mount it on the chassis.

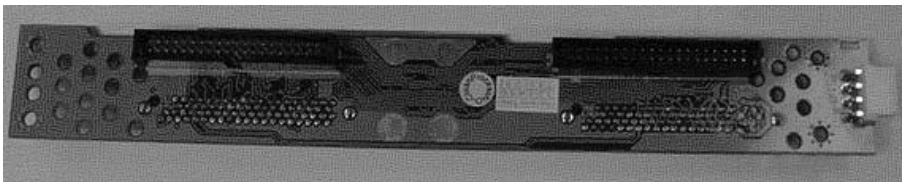


2.7 The HDD CAGE Installation

The EC-1017/EC-1018 HDD Cage supports two type backplane for HDD .



2.7.1 IDE HDD Backplane A93 (BID version only)



2.7.2 SCSI HDD Backplane G06 (BSD version only)

2.8 HDD Installation

The two HDD carriers inside your EC-1017/EC-1018 are used to hold the HDD. In order to remove and replace a HDD carrier follow these steps.

1. Unlock a drive carrier by releasing the plastic latch, on the right side of each carrier. Push the latch to the left, while pulling and sliding the drive carrier out of the chassis using the handle on the front.
2. To replace a drive carrier, push it all the way unto an empty bay of the chassis, until the latch fixes the drive in place.

2.8.1 Installation IDE HDD

1. Remove a HDD carrier from the chassis as described above.
2. Remove screws on rear of HDD carrier.
3. Connect Drive with HDD carrier rear panel. so that the power and IDE connectors correspond with the connectors inside the carrier.
4. Carefully push the disk drive in the HDD carrier , Secure rear panel using screws.
5. Make sure the connectors are firmly seated, secure the HDD drive in with the flat screws provided, next slide and lock the loaded carrier into the chassis.

2.8.2 Installation SCSI HDD

1. Remove a HDD carrier from the chassis as described above.
2. Place the disk drive in the drive carrier.
3. Secure the HDD drive in with the flat screws provided, next slide and lock the loaded carrier into the chassis.

Appendix A Alarm board user's manual

Alarm Board User's Manual
A106

INTRODUCTION
The main function of Alarm Board A106 is to check whether the temperatures in the chassis and the speed of the fans are normal. It also via an external WatchDog timer to monitors user's system is working properly or has dropped halt.

To calculate speed of fans, A106 provides four sets of counter and two 8-bit ADCs (Analog to Digital Converter) to scan temperature. It also implements one RS232 WatchDog which contacts system periodically. Should there be any abnormality, A106 will alarm the user in two ways. One is by turning on Fan/Temp Fail LED and trigger the buzzer. The other is by passing messages to system through the RS232 interface, and also to LCD Module.

A106 also provides optional functions such as displaying company banner or information on LCD, or automatically increasing fan speed via temperature rising (Auto Mode), passing system messages for LCD display, and provide system relevant data like fan speed and chassis temperature if required, and actively passing messages if on-board buttons are pressed.
A106 also implements one EEPROM to store working parameters, so that they can be re-programmed after shipping. Those parameters can be easy accessed via RS232 interface of PC.

Implementation
A106 comprises the following parts
One A106 Main Board.
Two LEDs with cable and connectors.
One D_Sub 9 pin female cable for connecting to PC.
One 4-wire cable for connecting LCD Module.
Two Thermresistor cables with connectors.
One LCD Module A78 (optional).
One 2-wire cable with switch to turn off the buzzer.
One 3-wire cable for power

The system block is illustrated in Fig. 1. Complete the connection and turn on the power, the two LEDs then blinks for one second before the fans start running. The LCD first displays 'Connecting A106 Ver.01 OK' for two seconds and then 'ICP Electronic' which can be changed later by users, and thirdly, Fan/Temperature.

- **Pin Definition**

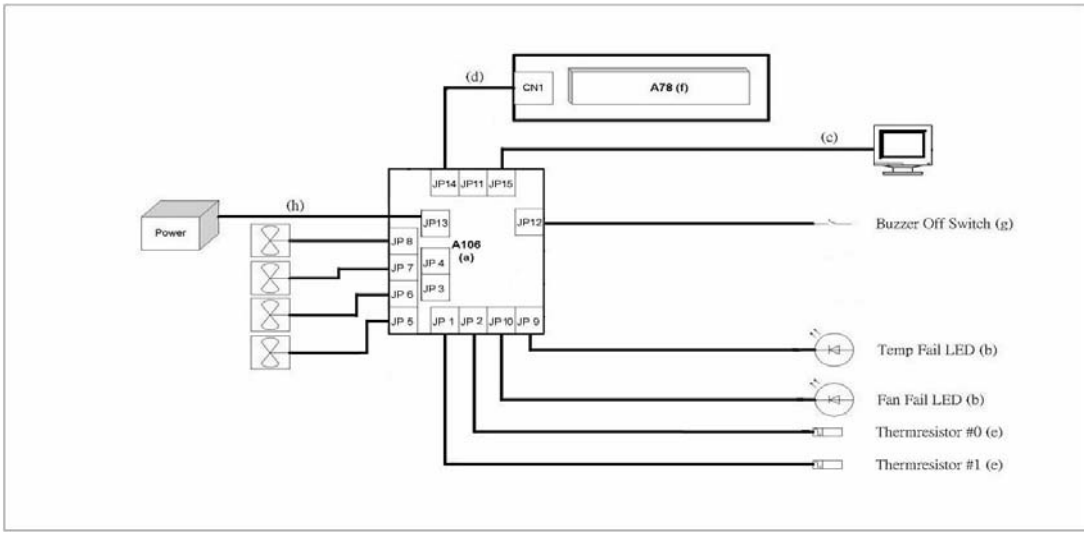


Fig. 1.

On A78

CN1	1	+5V	Power	5V power in
	2	Rx	In	UART Data In
	3	Tx	Out	UART Data Out
	4	GND	Ground	Ground

**The UART uses 1200 Baud Rate, 8 bit, 1 stop bit, no parity check, 5V Signal.

On A106

JP14	1	+5V	Power	5V power in
	2	Tx	Out	UART Data Out
	3	Rx	In	UART Data In
	4	GND	Ground	Ground

**The UART uses 1200 Baud Rate, 8 bit, 1 stop bit, no parity check, 5V Signal.

JP11	1	+5V	Power	5V power in
	2	Tx	Out	RS232 Data Out
	3	Rx	In	RS232 Data In
	4	GND	Ground	Ground

**This port is reserved for expansion.

JP15	1	Tx	Out	RS232 Data Out
	2	GND	Ground	Ground
	3	Rx	In	RS232 Data In

This port uses 1200 Baud Rate, 8 bit, 1 stop bit, no parity check, **±12V Signal.

JP10	1	LED+	In	LED Anode
	2	LED-	Out	LED Cathode

**Fan Fail LED

JP9	1	LED+	In	LED Anode
	2	LED-	Out	LED Cathode

**Temp Fail LED

JP1	1	Tr1	In	Thermresistor Signal In
	2	Tr2	Ground	Ground

**Temperature#0 Sensor

JP2	1	Tr1	In	Thermresistor Signal In
	2	Tr2	Ground	Ground

**Temperature#1 Sensor

JP5	1	GND	Ground	Ground
	2	+12V	Power	Drive Power
	3	SG	In	Fan Speed Signal

**Fan#0 Connector

JP6	1	GND	Ground	Ground
	2	+12V	Power	Drive Power
	3	SG	In	Fan Speed Signal

**Fan#1 Connector

JP7	1	GND	Ground	Ground
	2	+12V	Power	Drive Power
	3	SG	In	Fan Speed Signal

**Fan#2 Connector

JP8	1	GND	Ground	Ground
	2	+12V	Power	Drive Power

	3	SG	In	Fan Speed Signal

**Fan#3 Connector

JP13	1	+5V	Power	System Power
	2	+12V	Power	System Power
	3	GND	Ground	Ground

**System Power Connector

JP12	1	Sw1	COM	Switch Terminal COM
	2	Sw2	NO	Switch Terminal NO

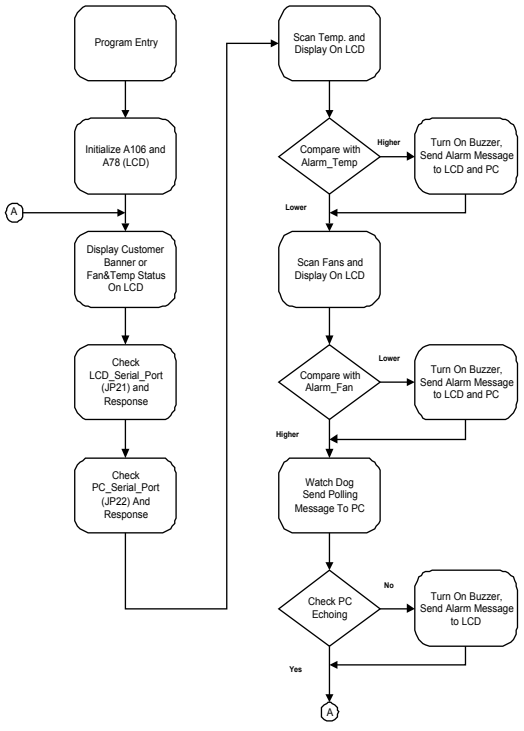
**Buzzer Reset Switch, press to shut down the buzzer for 240 seconds before it resumes the beep.

Jumper Setting

JP3	1,2	Short	Disable Temp #0 Alarm
		Open	Enable Temp #0 Alarm
	3,4	Short	Disable Temp #1 Alarm
		Open	Enable Temp #1 Alarm

JP4	1,2	Short	Disable Fan#0 Alarm
		Open	Enable Fan#0 Alarm
	3,4	Short	Disable Fan#1 Alarm
		Open	Enable Fan#1 Alarm
	5,6	Short	Disable Fan#2 Alarm
		Open	Enable Fan#2 Alarm
	7,8	Short	Disable Fan#3 Alarm
		Open	Enable Fan#3 Alarm

Process Flow Chart of A106


Program Entry
Initialize A106 and A78 (LCD)
A
Display Customer Banner or Fan&Temp Status On LCD
Check LCD_Serial_Port (JP21) and Response
Check PC_Serial_Port (JP22) And Response
Scan Temp. and Display On LCD
Compare with Alarm_Temp
Higher
Turn On Buzzer, Send Alarm Message to LCD and PC
Lower
Scan Fans and Display On LCD
Compare with Alarm_Fan
Lower
Turn On Buzzer, Send Alarm Message to LCD and PC
Higher
Watch Dog Send Polling Message To PC
Check PC Echoing
No
Turn On Buzzer, Send Alarm Message to LCD
Yes
A

How to Changing Alarm Temperature

A106 can be easily re-programmed via software. To set up and receive data from A106, you can use your familiar serial port communication tools to work with.

Simply connect A106 to your PC on COM1 with the D-Sub cable, run the communication program on 1200 baud rate and data format set on N, 8,1, (do not forget connecting two temperature sensors and four fans) and turn on the power supply of A106. Based on the protocol in appendix A, send the following command:

Send to A106: 0x4D 0x22 0x00 0x46

Where:
0x4D indicates this command comes from the system
0x22 'Set Alarm Temperature'
0x00 index Temp #0
0x46 alarm temperature set on 70 ℃

After this command is sent, A106 stores this parameter in its EEPROM and will trigger the buzzer when Temp#0 is over 70℃.

To double-check the setting, user can send the following command:

Send to A106: 0x4D 0x23 0x00

Where:
0x4D indicates this command comes from the system
0x23 'Get Alarm Temperature'
0x00 index Temp#0

After this command is sent, A106 replies the following message:

Receive from A106: 0x53 0x24 0x00 0x46

Where:
0x53 indicates this command comes from A106
0x24 'Report Alarm Temperature'

0x00 index Temp#0
0x46 the current set value

The setting of Alarm **Temperature #1** is the same as the above, except that the index number is changed from 0x00 to 0x01.

After the setting, A106 senses the temperatures. If temperature #0 is higher than the set value, A106 first triggers the buzzer, and the Temp Fail LED blinks; then the message:

Warning
T0 Over Heat

is displayed on LCD before/and the event report '0x53 0x34 0x01' is passed to the system.

How to Changing Alarm Fan Speed

The procedure of setting Alarm Fan Speed is similar to that of setting Alarm Temperature. Based on the protocol in Appendix A, send the command:

Send to A106: 0x4D 0x25 0x00 0x0F

Where:
0x4D indicates this command comes from the system
0x25 'Set Alarm Fan Speed'
0x00 index Fan#0
0x0F trigger A106 alarm if Fan#0 speed lower than 900 RPM (Where 900=0x0F multiply by 60, which 60 is a constant multiplier that A106 internally uses.)

Similarly, to double-check the setting stored in A106, simply send 'Get Alarm Fan Speed' command:

Send to A106: 0x4D 0x26 0x00

Where:
0x4D indicates this command comes from the system
0x26 'Get Alarm fan Speed'
0x00 index Fan#0

As soon as this command is sent, A106 replies the system with the message,

Receive from A106: 0x53 0x27 0x00 0x0F

Where:
0x53 indicates this command comes from A106
0x27 'Report Alarm Fan Speed'
0x00 index Fan#0
0x0F value stored in A106

A106 then detects the speeds of 4 fans, and if there is any fan running slower than the set speed, A106 first triggers the buzzer, and the Fan Fail LED blinks before the message

Warning
Fan0 Fail

is displayed on LCD. The event report *'0x53 0x34 0x02'* is then passed to system warning speed abnormality has taken place.

How to Setting WatchDog

A106 has implemented a WatchDog function to insure A106's access to the system. After WatchDog is enabled, A106 periodically sends polling message to system and wait for system echo. If the system fails to reply after WatchDog sends the message consecutively for 5 times, WatchDog assumes that the system has drop halt and starts the alarming procedure, i.e., triggering the buzzer, and displaying warning message on the LCD.

Warning System Holding

The setting command is as followed,

Send to A106: 0x4D 0x12 0x01 0x0A

Where:
0x4D indicates this command comes from the system
0x12 'Set WatchDog Mode and Time Interval'
0x01 enable WatchDog
0x0A send polling messages to the system every 10 seconds.

To double-check the setting, send the following command:

Send to A106: 0x4D 0x2A

Where:
0x4D indicates this command come from the system
0x2A 'Get WatchDog Mode and Time Interval'

A106 then replies with:

Receive from A106: 0x53 0x13 0x01 0x0A

Where:
0x53 indicates this command comes from A106
0x13 'Report WatchDog Mode and Time Interval'
0x01 WatchDog enabled
0x0A time interval set at 10seconds

After setting, WatchDog is been enable and will send '0x53 0x20' the Polling Command every 10sec, system after receive this command, it should reply '0x4D 0x21' the Echo Command to tell WatchDog alive and keep silence.

To disable WatchDog, send the following command:

Send to A106: 0x4D 0x12 0x00 0x0A

Where:
0x00 disable WatchDog

How to Displaying Message on LCD

Besides alarm messages, the LCD Module can also display short messages from the system. Here is an example:

Send to A106: 0x4D 0x28

Where:
0x28 'Stop LCD Auto Clock Display'

Send to A106: 0x4D 0x0D

Where:
0x0D 'Clear LCD'

Send to A106: 0x4D 0x0C 0x00 0x03 0x49 0x43 0x50

Where:
0x0C 'Display Character on LCD'
0x00 the characters displayed on line0 (first line on LCD)
0x03 indicates that there will three characters displayed

And the string
0x49 0x43 0x50 ASCII codes for 'ICP'

After the commands are sent, the LCD first stops the clock and clear the display, then 'ICP' is shown on the upper-left corner of LCD like:

ICP

If you like to stop this display and return to the default display, send this command:

Send to A106: 0x4D 0x29

Where:
0x29 'Start LCD Auto Clock Display'

LCD then retrieves the display from system and start displaying the clock.

How Setting your 'First Display'

First Display command is a little different from that of 'Display Character on LCD' describe in the last section. The latter displays characters at the request of the system and may be cleared anytime, while the former stores the contents in A106 EEPROM and display the messages on LCD regularly. This function is to allow users to display permanent messages such as company name, machine model and phone number, etc. on the LCD screen.

Here is an example.

Send to A106: 0x4D 0x2E 0x20 0x49 0x43 0x50 0x20 0x45 0x6C 0x65 0x63 0x74 0x72 0x6F 0x6E 0x69 0x63 0x20

Where:
0x4D indicates this command comes from the system
0x2E 'Set First Display Line0' messages displayed on Line0, i.e., first line on LCD
0x20 time allowed to toggle the display of the Fan&Temp Data screen (in this case, 32 seconds. If the value is zero, First_Display_Screen messages will stay on LCD permanently)

and the string:
0x49 0x43 0x50 0x20 0x45 0x6C 0x65 0x63 0x74 0x72 0x6F 0x6E 0x69 0x63 0x20
are the ASCII codes for 'ICP Electronics'

How to Controlling the Fan

In most cases, the fans are driven to the full speed to cool the system. However, there are times when the chassis is installed in cooler environment, and the fan speed may be lowered in order to reduce the noises. As a result, A106 has implemented a fan control function with 2 choices offered to users- the Manual Control or Auto Control of fans.

Manual Control

The Manual Control applies fixed power to fans which is separated into 4 levels. Level 0 stands for 5/8 power, Level 1 for 6/8 power, Level 2 for 7/8 power and Level 3 for full power. Users can choose the proper level to fit the circumstances.

Send to A106: 0x4D 0x1D 0x00 0x02

Where:
0x4D indicates this command come from the system
0x1D 'Set Fan Control Level'
0x00 Manual Control (Fixed Mode)
0x02 Power set on Level 2

Now the fans are driven by 7/8 power, and the noises are accordingly reduced.

Automatic Mode

In this mode, one simple formula is applied to control the fan power. First, A106 calculates the difference between current temperature and the Alarm Temperature. For every 5℃ increase, the driven power goes up for one level. For example, if the Alarm Temperature is 70℃, and the current temperature is below 75℃, the power is set on Level 0. When the current temperature is above 75℃ but below 80℃, the power is set on Level 1. Similarly, if the temperature is above 80℃ but below 85℃, the power is set on Level 2. When the temperature goes up above 85℃, the fans are driven to the full power. Here is an example.

Send to A106: 0x4D 0x1D 0x01 0x00

Where:
0x4D indicates this command comes from the system
0x1D 'Set Fan Control Level'
0x01 A106 set in Auto Mode
whilst **0x00** is only padding.

How to Adjusting The Clock on LCD

The LCD Module A78 has implemented a real time clock on board which provides the information of year, month, day, hour, min, second. It is also equipped with a backup battery that lasts for more than 3 years. There are 2 ways to adjust the clock- one by two buttons on the board and the other via software.

Adjusting by Buttons

Step 1: Press the upper button for more than 3 seconds until a blinking cursor appears on the LCD screen.

Step 2: Press the lower button to adjust time.

Step 3: Press the upper button again to advance the blinking cursor to the next position.

Step 4: repeat Step 2 and Step 3.

Step 5: When the clock is set, press the upper button again for more than 3 seconds to leave Edit Mode, until the cursor disappears and the clock starts running.

Software Adjusting via

To adjust the clock on A78 via software, here is an example.

Send to A106: 0x4D 0x09 0x00 0x0C 0x07 0x0D 0x28 0x05

While 0x4D means this command comes from System, 0x09 is the command of 'Setting Clock Time'.

And where

0x00 year 2000
0x0C December
0x07 7th Day
0x0D 13 o'clock
0x28 40 minutes
0x05 5 seconds

Others commands

The Peripheral Communication Protocol in Appendix A comprise 52 commands which can be separated into 2 groups.

Group A: from System to A106

Get_ID (0x00)
Set_LED_On/Off (0x02)
Get_LED_Status (0x03)
Get_Button_Status (0x06)
Get_Protocol_Version (0x07)
Set_Clock_Time (0x09)
Get_Clock_Time (0x0B)
Display_Character_On_LCD (0x0C)
Clear_LCD (0x0D)
Get_Fan_RPM (0x0E)
Get_Temperature (0x10)
Set_WatchDog_Mode_and_Timer (0x12)
Get_watchdog_Status (0x2A)
How_Many_Fan (0x14)
How_Many_Temperature (0x15)
Set_Fan_Control_Level (0x1D)
Get_Fan_Control_Level (0x1E)
Echo_WatchDog (0x21)
Set_Alarm_Temperature (0x22)
Get_Alarm_Temperature (0x23)
Set_Alarm_Fan_Speed (0x25)
Get_Alarm_Fan_Speed (0x26)
Stop_LCD_Self_Regular_Display (0x28)
Start_LCD_self_Regular_Display (0x29)
Set_LCD_Special_Flags (0x2B)
Get_LCD_Special_Flags (0x2C)
Set_First_Display_Line0 (0x2E)
Set_First_Display_Line1 (0x2F)
Get_First_Display_Line0_Contents (0x30)
Get_First_Display_Line1_Contents (0x31)
Set_Clock_Adjustment_Mode (0x35)
Get_Clock_Adjustment_Mode (0x36)
Reset (0xFF)

Group B: From A106 to System

Report_ID (0x01)
Report_LED_Status (0x04)
Report_Button_Status (0x05)
Report_Protocol_Version (0x08)
Report_Clock_Time (0x0A)
Report_Fan_RPM (0x0F)
Report_Temperature (0x11)
Report_WatchDog_Status (0x13)
Report_How_Many_Fan (0x17)
Report_How_Many_Temperature (0x16)
Report_Fan_Control_Level (0x1F)
WatchDog_Polling (0x20)
Report_Alarm_Temperature (0x24)
Report_Alarm_Fan_Speed (0x27)
Report_LCD_Special_Flags (0x2D)
Report_First_Display_Line0_Contents (0x32)
Report_First_Display_Line1_Contents (0x33)
Report_Event (0x34)
Report_Clock_Adjustment_Mode (0x37)
Ack (0xFA)
Nack (0xFB)
Reset_OK (0xAA)

For more details, please refer to examples in Appendix A.

Manufacturer Setting

Before shipping, the manufacturer has initialized the A106 as the below list in order to fit in most circumstances. However, the device can be re-programmed to meet users' needs.

Alarm Temperature #0 = 70℃
Alarm Temperature #1 = 70℃
Alarm Fan Speed #0 = 900 RPM
Alarm Fan Speed #1 = 900 RPM
Alarm Fan Speed #2 = 900 RPM
Alarm Fan Speed #3 = 900 RPM
Fan Control = Manuel Control (fix Control)
Fan Control Speed = Full Speed
Watch Dog Function = Disable
Watch Dog Timer = 10 sec
First Display Line0 = 'ICP Electronics'
First Display Line1 = ' '

Notes

Due to the limited resource of MCU, please note that:

A. The UART buffer equipped in A106 is only 16 bytes. If the system is to send commands over 16 bytes to A106, the data traffic is better to be separated into smaller packages, each under 16 bytes, and delays at intervals are needed to avoid data overflow.

B. A106 only supports the Thermresistors from 'SemiTec company model 103JT-025-3P'. Therefore, other Thermresistors may not be suitable for the database built in A106. The LCD can only reflect temperatures from 10℃ to 99℃. Temperatures below or above the range will be truncated to 10℃ or 99℃, respectively.

C. The Fan speed counters on A106 can count the frequency up to 9,999 RPM, which is well above the speed of most DC Fans. However,it is recommended not to use the maximum speed, otherwise, an incorrect count value will be displayed on LCD.

D. Short circuit of JP3 and JP4 does not actually disable the detection of Fan and Temp. Instead, it connects the input to a dummy signal to replace the original input. As a result, there are two signals generated from A106. One is a fixed 3150RPM clock to simulate itself as a normal but solid dummy fan. The other is a fixed resister (10Kohm), which is treated as a normal temperature (25℃) signal to A106. Both signals detected by A106 will be regarded as normal, and therefore keep the buzzer off.

The ICP Peripheral Communication Protocol Version 0.01

0x00

Direction	Device → Alm/LCD Board
Content	Get ID
Command	0x4D 0x00
Emphasis	0x4D='M'; 0x00=Get ID
Response To	None
Example	0x4D 0x00

0x01

Direction	Alm/LCD Board → Device
Content	Report ID
Command	0x53 0x01 0xXX 0xYY
Emphasis	0x53='S'; 0x04=Report ID; 0xXX, 0xYY=ID;
Response To	Get ID
Example	0x53 0x01 0x00 0x4E (Board ID= 0x004E ---A078)

0x02

Direction	Device → Alm/LCD Board
Content	Set LED On/Off
Command	0x4D 0x02 0xXX 0xYY
Emphasis	0x4D='S'; 0x02=Set LED On/Off; 0xXXYY=LED on/off, XXYY<15:0>=LED<15:0>, 1=On, 0=off
Response To	None
Example	0x4D 0x02 0x00 0x03 (Set LED0, LED1 On)

0x03

Direction	Device → Alm/LCD Board
Content	Get LED Status
Command	0x4D 0x03
Emphasis	0x4D='M'; 0x03=Get LED Status
Response To	None
Example	0x4D 0x03

0x04

Direction	Alm/LCD Board → Device
Content	Report LED Status
Command	0x53 0x04 0xXX 0xYY
Emphasis	0x53='S'; 0x04=Report LED status; 0xXXYY=LED on/off XXYY<15:0>=LED<15:0>, 1=On, 0=Off
Response To	Get LED Status
Example	0x53 0x04 0x00 0x0F (LED<3:0> is On)

0x05

Direction	Alm/LCD Board → Device
Content	Report Button Status
Command	0x53 0x05 0xXX 0xYY
Emphasis	0x53='S'; 0x05=Report Button status; 0xXXYY=Buttons on/off XXYY<15:0>=Button<15:0>, 1=Pressed, 0=Release
Response To	Get Button Status
Example	0x53 0x05 0x00 0x80 (Sw7 is On)

0x06

Direction	Device → Alm/LCD Board
Content	Get Button Status

Command	0x4D 0x06
Emphasis	0x4D='M'; 0x06=Get Button Status
Response To	None
Example	0x4D 0x06

0x07

Direction	Device → Alm/LCD Board
Content	Get Protocol version
Command	0x4D 0x07
Emphasis	0x4D='M'; 0x07=Get Protocol Version
Response To	None
Example	0x4D 0x07

0x08

Direction	Alm/LCD Board → Device
Content	Report Protocol version
Command	0x53 0x08 0xXX 0xYY
Emphasis	0x53='S'; 0x08=Report Protocol Version; 0xXX=Class; 0xYY=version (00~FF)
Response To	Get Protocol Version
Example	0x53 0x08 0x00 0x01 (Version 01)

0x09

Direction	Device → Alm/LCD Board
Content	Set Clock Time
Command	0x4D 0x09 0xYY 0xMM 0xDD 0xHH 0xmm 0xSS
Emphasis	0x4D='M'; 0x09=Set Clock Time; 0xYY=Year (00~99) Map to (2000 ~ 2099) 0xMM=Month (01 ~ 12) 0xDD=Day (01 ~ 31) 0xHH=Hour 24Hr Mode (00~23) 0xmm=Minute (00~59) 0xSS=Second (00~59)
Response To	None
Example	0x4D 0x09 0x00 0x0C 0x07 0x0D 0x28 0x05 (Set Time on 2000/12/07 13:40:05)

0x0A

Direction	Alm/LCD Board → Device
Content	Report Clock Time
Command	0x53 0x0A 0xYY 0xMM 0xDD 0xHH 0xmm 0xSS
Emphasis	0x53='S'; 0x0A=Report Clock Time; 0xYY=Year (00 ~ 99) Map to (2000 ~ 2099) 0xMM=Month (01 ~ 12) 0xDD=Day (01 ~ 31) 0xHH=Hour 24Hr Mode (00~23) 0xmm=Minute (00~59) 0xSS=Second (00~59)
Response To	Get Clock Time
Example	0x53 0x0A 0x00 0x0C 0x07 0x0D 0x28 0x09 (Report Time 2000/12/07 13:40:09)

0x0B

Direction	Device → Alm/LCD Board
Content	Get Clock Time
Command	0x4D 0x0B
Emphasis	0x4D='M'; 0x0B=Get Clock Time
Response To	None
Example	0x4D 0x0B

0x0C

Direction	Device → Alm/LCD Board
Content	Display Character on LCD
Command	0x4D 0x0C 0x0L 0x0N $0xXX_1$ ~ $0xXX_{15}$
Emphasis	0x4D='M'; 0x0C=Display Character On LCD; 0x0L=0x00 (Line 0), 0x0L=0x01 (Line 1); 0x0N=N Character (1~15), Note: no more than 15 characters; 0xXXn=ASCII Codes of Characters,
Response To	None
Example	0x4D 0x0C 0x01 0x03 0x49 0x43 0x50 (Line 1, 3 Characters, 'ICP')

0x0D

Direction	Device → Alm/LCD Board
Content	Clear LCD
Command	0x4D 0x0D
Emphasis	0x4D='M'; 0x0D=Clear LCD
Response To	None
Example	0x4D 0x0D

0x0E

Direction	Device → Alm Board
Content	Get Fan#N RPM
Command	0x4D 0x0E 0x0N
Emphasis	0x4D='M'; 0x0E=Get Fan#N RPM; 0x0N=Fan#N (0~15)
Response To	None
Example	0x4D 0x0E 0x02 (Get Fan2 PRM)

0x0F

Direction	Alm Board →Device
Content	Report Fan#N RPM
Command	0x53 0x0F 0x0N 0xRR
Emphasis	0x53= '; 0x0F=Report Fan#N RPM; 0x0N=Fan#N (0~15); 0xRR=RPM/60
Response To	Get Fan#N RPM
Example	0x53 0x0F 0x02 0x37 (Fan2=0x37 x 60=3300 rpm)

0x10

Direction	Device → Alm Board
Content	Get Temperature#N
Command	0x4D 0x10 0x0N
Emphasis	0x4D='M'; 0x10=Get Temperature#N; 0x0N=Temperature#N (0~15);
Response To	None
Example	0x4D 0x10 0x03 (Get Temperature3)

0x11

Direction	Alm Board →Device
Content	Report Temperature#N
Command	0x53 0x11 0x0N 0xTT
Emphasis	0x53='S'; 0x11=Report Temp#N; 0x0N=Temp#N (N=0~15); 0xTT=0 ~ 99 ℃
Response To	Get Temperature#N
Example	0x53 0x11 0x03 0x1B (Temperature 3 is 27℃)

0x12

Direction	Device → Alm Board
Content	Set WatchDog Mode and Timer
Command	0x4D 0x12 0x0X 0xNN

Emphasis	0x4D='M'; 0x12=Set WatchDog Mode and Timer; 0x0X=Control Mode, 0x00=Watch Dog Off, 0x01=On; 0xNN=Timer (1..180 sec)
Response To	None
Example	0x4D 0x12 0x01 0xB4(Enable WatchDog, Timer=180 sec) 0x4D 0x12 0x00 0x64(Disable WatchDog, Timer=100 sec)

0x13

Direction	Alm Board →Device
Content	Report WatchDog Status
Command	0x53 0x13 0x0X 0xNN
Emphasis	0x53='S'; 0x13=Report WatchDog Status; 0x0X=Control Mode; 0xNN=WatchDog Timer Set.
Response To	Get WatchDog Status
Example	0x53 0x13 0x01 0x0A (WatchDog Enabled, WatchDog Timer=10sec)

0x14

Direction	Device → Alm Board
Content	How Many Fans
Command	0x4D 0x14
Emphasis	0x4D='M'; 0x14=How Many Fans?
Response To	None
Example	0x4D 0x14

0x15

Direction	Device → Alm Board
Content	How many Temperatures
Command	0x4D 0x15
Emphasis	0x4D='M'; 0x15=How Many Temperatures?
Response To	None
Example	0x4D 0x15

0x16

Direction	Alm Board →Device
Content	Report how many Temperatures
Command	0x53 0x16 0xXX
Emphasis	0x53='S'; 0x16=Report How many Temperatures; 0xXX=# of Temperature (1~16);
Response To	How many Temperatures
Example	0x53 0x16 0x02 (2 Temperatures)

0x17

Direction	Alm Board →Device
Content	Report How Many Fans
Command	0x53 0x17 0xXX
Emphasis	0x53='S'; 0x17=Report How many Fans; 0xXX=# of Fan (1~16);
Response To	How many Fans
Example	0x53 0x1B 0x04 (4 Fans here)

0x1D

Direction	Device → Alm Board
Content	Set Fan Control Level
Command	0x4D 0x1D 0x0X 0x0L
Emphasis	0x4D='M'; 0x1D=Set Fan Speed Level; 0x0X=Control Mode;0x0L=Manual Control Level.

	Where in Manuel Control Mode 0x0X=0x00	0x0X=0x00=Manuel Control, 0x0L=0x00=Level 00=Speed 0 0x0L=0x01=Level 01=Speed 1 0x0L=0x02=Level 02=Speed 2 0x0L=0x03=Level 03=Speed 3=Full Speed
	Where in Auto Control Mode 0x0X=0x01	0x0X=0x01=Auto Temperature Control Fan Control, The Control Temperature = Alarm Temperature (Ref. Command 0x22 set) 0x0L = Don't care Control Method = one level per 5℃ increase
Response To	None	
Example	0x4D 0x1D 0x00 0x03 (Manual Control, Full Speed) 0x4D 0x1D 0x01 0x00 (Auto Control)	

0x1E

Direction	Device → Alm Board
Content	Get Fan Control level
Command	0x4D 0x1E
Emphasis	0x4D='M'; 0x1E=Get Fan Control Level
Response To	None
Example	0x4D 0x1E

0x1F

Direction	Alm Board →Device
Content	Report Fan Control level
Command	0x53 0x1F 0x0C 0x0L
Emphasis	0x53='S'; 0x1F=Report Fan Control Level; 0x0C, 0x0L same as Set Fan Speed Level
Response To	Get Fan Control Level
Example	0x53 0x1F 0x00 0x03 (Fan under Manual Control, Full Speed)

0x20

Direction	Alm Board →Device
Content	WatchDog Polling
Command	0x53 0x20
Emphasis	0x53='S'; 0x20=WatchDog Polling;
Response To	None
Example	0x53 0x20

0x21

Direction	Device → Alm Board
Content	Echo WatchDog
Command	0x4D 0x21
Emphasis	0x4D='M'; 0x21=Echo WatchDog;
Response To	WatchDog Polling
Example	0x4D 0x21

0x22

Direction	Device → Alm Board
Content	Set Alarm Temperature
Command	0x4D 0x22 0x0N 0xTT
Emphasis	0x4D='M'; 0x22=Set Alarm Temperature; 0x0N: Temperature N (N=0..F); 0xTT : Alarm Temperature;
Response To	None
Example	0x4D 0x22 0x01 0x1E (Set Alarm Temperature 1 on 30℃)

0x23

Direction	Device → Alm Board
Content	Get Alarm Temperature
Command	0x4D 0x23 0x0N
Emphasis	0x4D='M'; 0x23=Get Alarm Temperature; 0x0N: Temperature N
Response To	None
Example	0x4D 0x23 0x00 (Get Alarm Temperature 0)

0x24

Direction	Alm Board →Device
Content	Report Alarm Temperature
Command	0x53 0x24 0x0N 0xTT
Emphasis	0x53='S'; 0x24=Report Alarm Temperature; 0x0N: Alarm Temperature N (0..F); 0xTT Alarm Temperature. In ℃.
Response To	Read Alarm Temperature
Example	0x53 0x24 0x01 0x1E (Report Alarm Temperature 1 set)

0x25

Direction	Device → Alm Board
Content	Set Alarm Fan Speed
Command	0x4D 0x25 0x0N 0xRR
Emphasis	0x4D='M'; 0x25=Set Alarm Fan Speed; 0x0N: Fan N(N=0..F); 0xRR: Alarm Fan Speed, in RPM/60
Response To	None
Example	0x4D 0x25 0x00 0x0F (Set Fan 0 Alarm Speed at 0x0Fx60=900 RPM)

0x26

Direction	Device → Alm Board
Content	Get Alarm Fan Speed
Command	0x4D 0x26 0x0N
Emphasis	0x4D='M'; 0x26=Get Alarm Fan Speed; 0x0N: Fan N
Response To	None
Example	0x4D 0x26 0x03 (Get Fan3 Alarm Speed set)

0x27

Direction	Alm Board →Device
Content	Report Alarm Fan Speed
Command	0x53 0x27 0x0N 0xRR
Emphasis	0x53='S'; 0x27=Report Alarm Fan Speed; 0x0N: Fan N; 0xRR Alarm Fan Speed In RPM/60.
Response To	Read Alarm Fan Speed
Example	0x53 0x27 0x01 0x0F (Report Alarm Fan 1 Speed set at 0x0F×60 = 900RPM)

0x28

Direction	Device → Alm/LCD Board
Content	Stop LCD Auto Clock Display
Command	0x4D 0x28
Emphasis	0x4D='M'; 0x28=Stop LCD Auto Clock Display;
Response To	None
Example	0x4D 0x28 (Stop LCD Auto Clock Display)

0x29

Direction	Device → Alm/LCD Board
Content	Start LCD Auto Clock Display
Command	0x4D 0x29
Emphasis	0x4D='M'; 0x29=Start LCD Auto Clock Display
Response To	None

Example	0x4D 0x29 (Start LCD Auto Clock Display)

0x2A

Direction	Device → Alm Board
Content	Get WatchDog Status
Command	0x4D 0x2A
Emphasis	0x4D='M'; 0x2A=Get WatchDog Status
Response To	None
Example	0x4D 0x2A

0x2B

Direction	Device → Alm/LCD Board
Content	Set LCD Special Flags
Command	0x4D 0x2B 0xXX
Emphasis	0x4D='M'; 0x2B=Set LCD Special Flags; 0xXX=Flags, X_0= 1:Turn On Watch_Dog_Flag Display on LCD 0:Turn Off Watch_Dog_Flag Display on LCD $X_{1..7}$ Reserved
Response To	None
Example	0x4D 0x2B 0x01 : Turn On Watch_Dog_Flag Display

0x2C

Direction	Device →Alm/LCD Board
Content	Get LCD Special Flags
Command	0x4D 0x2C
Emphasis	0x4D='M'; 0x2C=Get LCD Special Flags
Response To	None
Example	0x4D 0x2C

0x2D

Direction	Alm/LCD Board → Device
Content	Report LCD Special Flags
Command	0x53 0x2D 0xXX
Emphasis	0x53='S'; 0x2D=Report LCD Special Flags; 0xXX=Flags
Response To	Get LCD Special Flags
Example	0x53 0x2D 0x01 : Watch_Dog_Flag display turned on.

0x2E

Direction	Device →Alm Board
Content	Set First Display Line0
Command	0x4D 0x2E 0xTT $0xXX_0$..$0xXX_{15}$
Emphasis	0x4D='M'; 0x2E=Set First Display Line0, This string is given first priority to display and the contents are stored in EEPROM; 0xTT=Time to toggle to Second Display Screen, ranging from 0sec to 255sec; 0sec indicates no toggling. Second Display Screen regularly displays Fan and Temperature Messages from Alarm Board. $0xXX_x$=Characters in ASCII codes, fixed size: 15 characters.
Response To	None
Example	0x4D 0x2E 0x20 0x49 0x43 0x50 0x20 0x45 0x6c 0x65 0x63 0x74 0x72 0x6f 0x6e 0x69 0x63 0x20 (First display 'ICP Electronics' on Line0, and 32sec toggle to release display)

0x2F

Direction	Device → Alm Board
Content	Set First Display Line1
Command	0x4D 0x2F 0x00 $0xXX_0$..$0xXX_{15}$
Emphasis	0x4D='M'; 0x2F=Set First Display Line1, This string is given first priority to

	display and the contents are stored in EEPROM; 0x00 =Constant. $0xXX_x$=Characters in ASCII codes, fixed size: 15 characters.
Response To	None
Example	0x4D 0x2F 0x20 0x49 0x43 0x50 0x20 0x45 0x6c 0x65 0x63 0x74 0x72 0x6f 0x6e 0x69 0x63 0x20 (First display 'ICP Electronic' on Line1 and 32sec toggle to release display)

0x30

Direction	Device → Alm/LCD Board
Content	Get First Display Line0 Contents
Command	0x4D 0x30
Emphasis	0x4D='M'; 0x30=Get First Display Line0 Contents
Response To	None
Example	0x4D 0x30

0x31

Direction	Device → Alm/LCD Board
Content	Get First Display Line1 Contents
Command	0x4D 0x31
Emphasis	0x4D='M'; 0x31=Get First Display Line1 Contents
Response To	None
Example	0x4D 0x31

0x32

Direction	Alm/LCD Board →Device
Content	Report First Display Line0 Contents
Command	0x53 0x32 0xTT $0xCC_0..0xCC_{15}$
Emphasis	0x53='S'; 0x32=Report First Display Line0 Contents
Response To	Get First Display Line0 Contents
Example	0x53 0x32 0x0A 0x49 0x43 0x50 0x20 0x41 0x63 0x71 0x75 0x69 0x72 0x65 0x20 0x49 0x6E 0x63: (Report the contents of First Display is 'ICP Acquire Inc' on Line0 and the toggle time is 10 sec.)

0x33

Direction	Alm/LCD Board →Device
Content	Report First Display Line1 Contents
Command	0x53 0x33 0xTT $0xCC_0..0xCC_{15}$
Emphasis	0x53='S'; 0x33=Report First Display Line1 Contents
Response To	Get First Display Line0 Contents
Example	0x53 0x33 0x0A 0x49 0x43 0x50 0x20 0x41 0x63 0x71 0x75 0x69 0x72 0x65 0x20 0x49 0x6E 0x63 (Report the contents of First Display is 'ICP Acquire Inc' on Line1, and the toggle time is 10 sec.)

0x34

Direction	Alm Board →Device
Content	Report Event
Command	0x53 0x34 0xNN
Emphasis	0x53='S'; 0x34=Report Event 0xNN =0x01, Over Heat =0x02, Fan Fail
Response To	None
Example	0x53 0x34 0x01 (Report Event - Over Heat)

0x35

Direction	Device → Alm/LCD Board
Content	Set Clock Adjustment Mode

Command	0x4D 0x35 0xNN
Emphasis	0x4D='M'; 0x35=Set Clock Adjustment Mode; 0xNN =0x00, Disable Manual Adjustment =0x01, Enable Manual Adjustment
Response To	None
Example	0x4D 0x35 0x01 Enable Clock Manual Adjustment

0x36

Direction	Device → Alm/LCD Board
Content	Get Clock Adjustment Mode
Command	0x4D 0x36
Emphasis	0x4D='M'; 0x36=Get Clock Adjustment Mode
Response To	None
Example	0x4D 0x36

0x37

Direction	Alm/LCD Board →Device
Content	Report Clock Adjustment Mode
Command	0x53 0x37 0xNN
Emphasis	0x53='S'; 0x37=Report Clock Adjustment Mode 0xNN =0x00, Disable Manual Adjustment =0x01, Enable Manual Adjustment
Response To	Get Clock Adjustment Mode
Example	0x53 0x37 0x00 (Manual Adjustment disabled)

0xFA

Direction	LCD/LED/Alarm Board →Device
Content	Ack
Command	0x53 0xFA
Emphasis	0x53='S'; 0xFA=Ack;
Response To	N/A
Example	0x53 0xFA

0xFB

Direction	LCD/LED/Alarm Board → Device
Content	Negative Ack
Command	0x53 0xFB 0xCC
Emphasis	0x53='S'; 0xFB=Negative Ack; 0xCC Command;
Response To	N/A
Example	0x53 0xFB 0xF0 (NAK 0xF0 Command)

0xFF

Direction	Device → Alm Board
Content	Reset
Command	0x4D 0xFF
Emphasis	0x4D='M'; 0xFF=Reset Slave Device
Response To	None
Example	0x4D 0xFF

0xAA

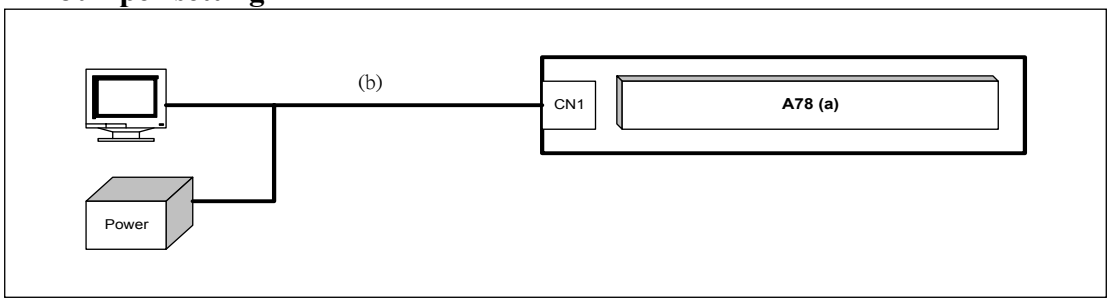
Direction	LCD/LED/Alarm Board → Device
Content	Reset OK
Command	0x53 0xAA
Emphasis	0x53='S'; 0xAA=Reset OK;
Response To	Reset
Example	0x53 0xAA

Appendix B LCD board user's manual

Introduction

A78 is a two lines with 20 characters LCD Module, designed specially for system easy and quickly display text message over it, A78 is very easily to be installed because it only use 2 wire RS232 interface to communicate with your system and 2 wires for +5V power supply and ground, following ICP Peripheral Communication Protocol , A78 will have versatile functions for your program, meanwhile, A78 provide you a on board battery backup real time clock default display on the right corner and provide system reading, the clock could be manual adjustment by two buttons or by system via software, A78 also provide you two readable buttons for system easily to access information with outside.

- **Jumper setting**



CN 1	1	+5V	Power	5V power in
	2	Rx	In	UART Data In
	3	Tx	Out	UART Data Out
	4	GND	Ground	Ground

The UART use 1200 Baud Rate and 8 bit, 1 stop bit, none parity check, 5V Signal.

How to Adjust The Clock on LCD

A78 has implement a real time clock on board and could provide you the year, month, day, hour, min, second information, it also equipment a backup battery to keep clock running individually over 3 year. You can adjust the clock by two ways, one by two buttons on the board and the other use software.

Button Adjustment

Step 1: Press the upper Switch over 3 sec and see one LED light and appear a blinking cursor on the LCD screen.

Step 2: Press the lower Switch to adjust to the correct time.

Step 3: Press the Upper Switch again to move the blinking cursor to the next position.

Step 4: Repeat Step 2 and Step 3.

Step 5: If every value is setting ok then press the upper switch again over 3 sec to leave Edit Mode, after that you can see the LED is turn off and the cursor is disappear and the timer is start running.

	!	“	#	$	%	&	‘	(	)	*	+	,	-	.	/
0x20	0x21	0x22	0x23	0x24	0x25	0x26	0x27	0x28	0x29	0x2A	0x2B	0x2C	0x2D	0x2E	0x2F

0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
0x30	0x31	0x32	0x33	0x34	0x35	0x36	0x37	0x38	0x39	0x3A	0x3B	0x3C	0x3D	0x3E	0x3F

@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
0x40	0x41	0x42	0x43	0x44	0x45	0x46	0x47	0x48	0x49	0x4A	0x4B	0x4C	0x4D	0x4E	0x4F

P	Q	R	S	T	U	V	W	X	Y	Z	[	¥	]	^	_
0x50	0x51	0x52	0x53	0x54	0x55	0x56	0x57	0x58	0x59	0x5A	0x5B	0x5C	0x5D	0x5E	0x5F

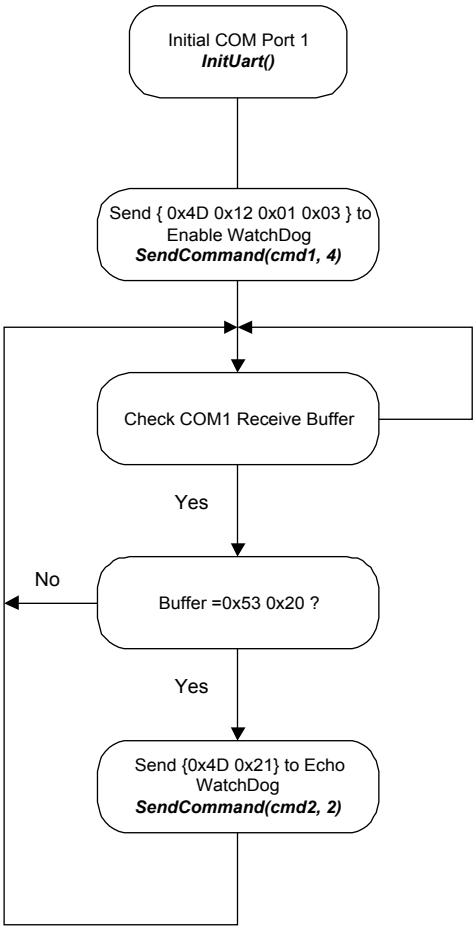
`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
0x60	0x61	0x62	0x63	0x64	0x65	0x66	0x67	0x68	0x69	0x6A	0x6B	0x6C	0x6D	0x6E	0x6F

p	q	r	s	t	u	v	w	x	y	z	{	|	}	→	←
0x70	0x71	0x72	0x73	0x74	0x75	0x76	0x77	0x78	0x79	0x7A	0x7B	0x7C	0x7D	0x7E	0x7F

**ASCII codes over 0x80 are reserved for special symbols, please contact your sales representatives for more details.

Appendix C Watchdog

This program here demonstrates the function of WatchDog and how it is enabled by software as well as how the software echoes the WatchDog and keeps the buzzer off.



```
{     ***************************************************************************
      *           Program : WatchDog Demo Program                               *
      *           Operation System : IBM PC, DOS 3.1 or above                   *
      *           Compiler : BCC 5.0 or above                                   *
      *           File name : WDSAMP.CPP                                        *
      *           Author : Ethan Wang in ICP                                    *
      *           Date : 01/04/2001                                             *
      *************************************************************************** }


#include <dos.h>
#include <stdio.h>
#include <conio.h>

#define IOBASE          0x3f8

// data bits = 8, stop bit = 1, no parity bit, baud rate = 1200
void InitUART()
{
      // Set baud rate to 1200
      outport(IOBASE + 3, 0x80);          // Line Control Register
      outport(IOBASE + 0, 96);            // Divisor Latch Low
      outport(IOBASE + 1, 0);             // Divisor Latch High

      // Set data bits, stop bit and parity bit.
      outport(IOBASE + 3, 0x03);
}
// Send command to Alarm Board
void SendCommand(char *cmd, int len)
{
      unsigned char status;
      for (int i = 0 ; i < len ; )
      {
            status = inport(IOBASE + 5);        // Line Status Register
            if ( status & 0x20 )                // Transmit-hold-register empty
            {
                  outport(IOBASE + 0, cmd[i]);      // Send to "Transmit Buffer"
                  i++;
            }
      }
}

int main()
{
      char cmd1[] = { 0x4d, 0x12, 0x01, 0x03 };       // Enable WatchDog with Timeout = 3 sec
      char cmd2[] = { 0x4d, 0x21 };                   // Echo WatchDog
      char rxbuf[20];               // Buffer to receive data from alarm board
      int   nrx;                    // How many bytes we had read
      int   sync;                   // Used to delimit reply code
      unsigned char status;

      // Serial Port Initialization
      InitUART();

      // Enable WatchDog
      printf("Enable WatchDog\n");
```

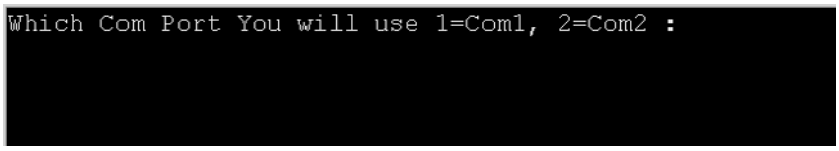
```
        SendCommand(cmd1, 4);

        nrx = 0;
        sync = 1;
        for ( ; ; )
        {
// Receive data from Alarm Board
                status = inport(IOBASE + 5);                    // Line Status Register
                if ( status & 0x01 )
                {
                        rxbuf[nrx++] = inport(IOBASE + 0);      // Receive Buffer
                }

                if ( !sync )
                {
                        if ( rxbuf[0] == 0x53 )
                        {
                                sync = 1;
                                nrx = 1;
                        }
                        else
                        {
                                nrx = 0;
                        }
                }

                if ( nrx == 2 )
                {
                        // Check if the reply code is "WatchDog Polling"
                        if ( rxbuf[0] == 0x53 && rxbuf[1] == 0x20 )
                        {
                                printf("WatchDog is polling\n");
                                // Echo WatchDog
                                SendCommand(cmd2, 2);
                        }
                        else
                        {
                                printf("Unknown reply code (%02x, %02x)\n", rxbuf[0], rxbuf[1]);
                                sync = 0;
                        }
                        nrx = 0;
                }

                if ( kbhit() )
                {
                        char c = getch();
                        if ( c == 'q' )
                                break;
                }
        }

        return 0;
}
```

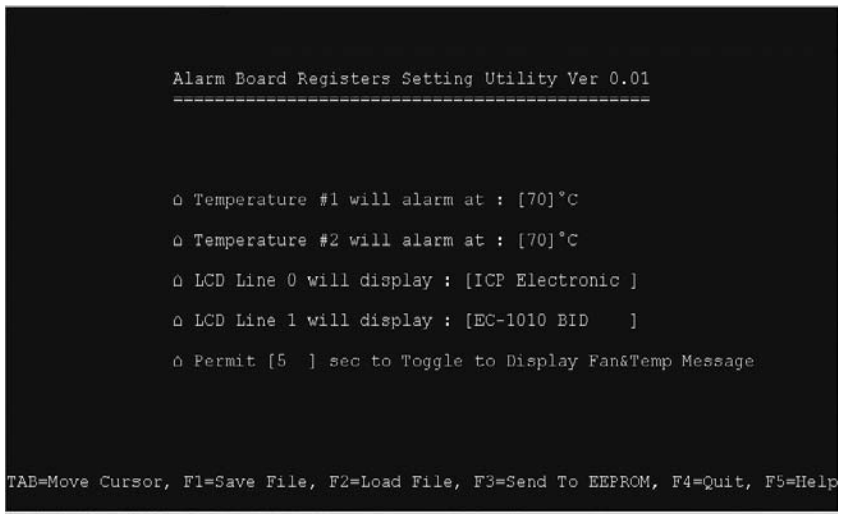
A-3 operation

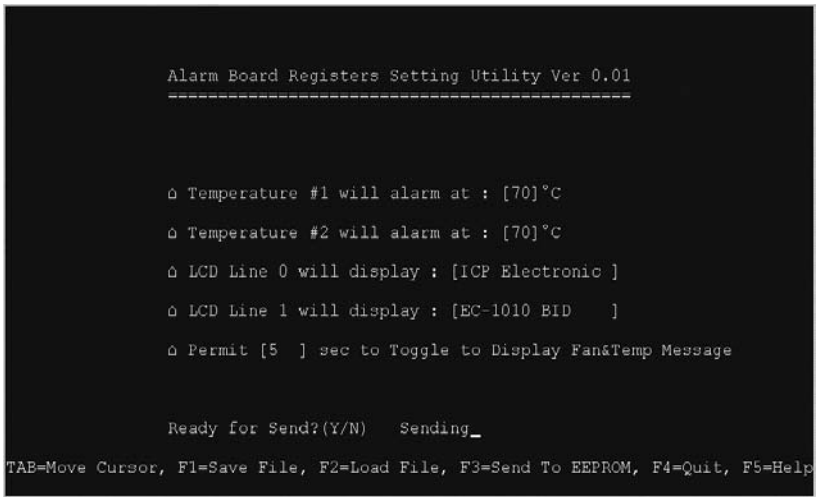
A106 utility operation procedure

1. Type alm_utl.exe
2. Choice which PC com port connect to A106
3. Edit item to setting your value
4. Execute " F3 " function key to download data to A106 EEPROM

Below are process picture for reference




Alarm Board Registers Setting Utility Ver 0.01
ä Temperature #1 will alarm at : [70]°C
ä Temperature #2 will alarm at : [70]°C
ä LCD Line 0 will display : [ICP Electronic]
ä LCD Line 1 will display : [EC-1010 BID]
ä Permit [5] sec to Toggle to Display Fan&Temp Message
TAB=Move Cursor, F1=Save File, F2=Load File, F3=Send To EEPROM, F4=Quit, F5=Help


Alarm Board Registers Setting Utility Ver 0.01
ä Temperature #1 will alarm at : [70]°C
ä Temperature #2 will alarm at : [70]°C
ä LCD Line 0 will display : [ICP Electronic]
ä LCD Line 1 will display : [EC-1010 BID]
ä Permit [5] sec to Toggle to Display Fan&Temp Message
Ready for Send?(Y/N) Sending_
TAB=Move Cursor, F1=Save File, F2=Load File, F3=Send To EEPROM, F4=Quit, F5=Help

Appendix D Power supply Specifications

AC INPUT :

VOLTAGE : 90V ~ 264V (47 ~ 63Hz)

CURRENT : 5.0A (MAX.AT 100V AC INPUT. FULL LOAD)

DC OUTPUT :

OUTPUT	V1	V2	V3	V4	V5	V6
VOLTAGE	**+3.3 V**	**+5 V**	**+12 V**	**-5 V**	**-12 V**	**+5 Vsb**
MIN. LOAD	**0 A**	**0.5A**	**0.5 A**	**0 A**	**0 A**	**0 A**
** MAX. LOAD	***20 A**	***28A**	**16A**	**0.5 A**	**1 A**	**2A**
PEAK LOAD.	**25A**	**40A**	**20A**			
***REGULATION	**±5%**	**+5/-4%**	**±5%**	**±5%**	**+8/-5%**	**±5%**
RIPPLE & NOISE (MAX.)	**50mV**	**50mV**	**120mV**	**50mV**	**120mV**	**50mV**

*+3.3V & +5V OUTPUT MAXIMUM **140 WATTS**.

** TOTAL OUTPUT MAXIMUM **300 WATTS**.

*** THE OUTPUT VOLTAGE LOAD REGULATION IS LESS THAN THE VALUES IN THE ABOVE TABLE BY CHANGING EACH OUTPUT LOAD ±40% FROM 60% OF RATED LOAD, A ND KEEP ALL OTHER OUTPUTS AT 60% OF RATED LOAD.

DIMENSION :

83(W) × 270(D) × 40.5(H) mm

SAFETY : Meet UL 60950, CSA C22.2 NO.60950, TUV EN 60950, IEC 60950, EMKO-TSE (74-SEC) 207/94

EMI : Meet FCC CFR 47 PART 15 SUBPART J , CLASS B LIMIT, EN 50081-1, CNS 13438 CLASS B.

EMS : EN 50082-1, EN 61000-4-2

ENVIRONMENT :

1. TEMPERATURE : OPERATING : 0 ~ 70℃

   STORAGE : -10 ~ +75 ℃

2. HUMIDITY : OPERATION 20% ~ 85% RH. (NON CONDENSING)

   STORAGE 10% ~ 95%RH. (NON CONDENSING)